

## **PICK-UP STYLE UTILITY VEHICLE WITH ADJUSTABLE CARGO BED**

### Technical Field

**[0001]** The present invention generally relates to a pick-up style utility vehicle with an adjustable cargo bed, and more particularly relates to a pick-up style utility vehicle with an adjustable cargo bed and a movable seat that the user may selectively position to optimize cargo space and passenger space.

### Background of the Invention

**[0002]** Pick-up style utility vehicles are typically characterized by a cargo bed located behind one or more rows of seats, each row having one or more seats. Each seat typically has a leg area positioned immediately in front of the seats, such that a person may ride in a sitting position. A steering wheel is typically positioned above the leg area of one of the seats. Pick-up style utility vehicles may be contrasted with other utility vehicles such as all-terrain vehicles (ATVs), which have a seat that is straddled by a rider and a handle bar for steering. Pick-up style utility vehicles are used for a wide variety of off-road utility applications, such as moving materials including lumber, farm and ranch tasks, golf course maintenance, hunting, etc.

**[0003]** Prior pick-up style utility vehicles with two rows of seats generally suffer from the drawback that less cargo may be accommodated, since the cargo bed must typically be shortened to allow room for an additional row of seats. Prior pick-up style utility vehicles with only one row of seats are typically equipped with larger cargo beds, but cannot accommodate a larger number of passengers. Thus, users that occasionally carry a large number of passengers, and occasionally carry large loads find that they cannot accomplish both tasks well with the same vehicle.

Brief Summary of the Invention

**[0004]** A pick-up style utility vehicle with an adjustable cargo bed is provided. According to one aspect of the invention, the utility vehicle includes a seat provided retractable into a leg area of the seat, and a cargo bed adjustably provided behind the seat such that a part of the cargo bed is moved into an area formerly occupied by the seat after the seat is retracted. The leg area may be in front of and/or below the seat. The seat may be at least a rearmost one of a plurality of seats disposed in a tandem manner.

**[0005]** The cargo bed may be of a rectangular shape, and have a bottom plate and a surrounding panel assembly including a front panel and a pair of side panels provided along a perimeter of the bottom plate. The bottom plate may be extended to underneath the seat, and the front panel may be located behind the seat when the seat is not retracted and is configured to be extendable forward to reach into where the seat has been located after the seat is retracted.

**[0006]** The front panel may be rotatably provided on a vertical axis to extend forward to reach into the area formerly occupied by the seat after the seat is retracted. The vertical axis may be provided at a front end of the side panel.

**[0007]** The surrounding panel assembly may include a side panel slidably provided along a side, and configured to extend forward to reach into the area formerly occupied by the seat after the seat is retracted.

**[0008]** The utility vehicle may further comprise a screen shield detachably provided to a front portion of the cargo bed. The cargo bed may be constructed to accommodate the screen shield in an extended part thereof to allow the screen shield to serve as the front panel.

**[0009]** The above and further objects and features of the invention will more fully be apparent from the following detailed description with accompanying drawings.

Brief Description of the Several Views of the Drawings

[0010] FIG. 1 is a perspective view of a pick-up style utility vehicle with an adjustable cargo bed according to one embodiment of the present invention;

[0011] FIG. 2A is a schematic left side view of the FIG. 1 with the vehicle's rear seat occupied by passenger(s);

[0012] FIG. 2B is a view of the utility vehicle of FIG. 2A, showing the rear seat retracted and the cargo bed extended;

[0013] FIG. 3A is a schematic left side view of the utility vehicle of another embodiment according to the present invention with the vehicle's rear seat occupied by passenger(s);

[0014] FIG. 3B is a view of the utility vehicle of FIG. 3A, showing the rear seat retracted and the cargo bed moved forward;

[0015] FIG. 4A is a partial schematic view of the utility vehicle in the configuration shown in FIG. 2A, showing the rear seat in the deployed configuration;;

[0016] FIG. 4B is a partial schematic view of the utility vehicle in the configuration shown in FIG. 2B, showing the rear seat in the stowed configuration, in which a bottom of the rear seat is positioned adjacent a front panel of the cargo bed;

[0017] FIGS. 5A is a partial schematic view of the utility vehicle shown in the configuration shown in FIG. 2A, showing the rear seat in a deployed configuration;

[0018] FIGS. 5B is a partial schematic view of the utility vehicle in the configuration shown in FIG. 2B, showing the rear seat in a stowed configuration, in which a bottom of the rear seat is positioned adjacent a bottom plate of the cargo bed;

[0019] FIG. 6 is a perspective view of the cargo bed of FIGS. 2A and 2B, showing extendable portions of the cargo bed according to one embodiment of the present invention, the extendable portions being configured to rotatably extend from a retracted configuration in which the portions border a front panel of the cargo bed, to an extended configuration in which the extendable portions form side panels of the cargo bed; and

[0020] FIG. 7 is a perspective view of a cargo bed of FIGS. 2A and 2B, extendable portions of the cargo bed according to another embodiment of the present invention, in which the extendable portions are configured to slide from a retracted position to an extended position along the sides of the cargo bed.

#### Detailed Description of the Invention

[0021] The present invention will now be described in detail referring to the accompanying drawings illustrating the embodiments thereof.

[0022] FIG. 1 is a perspective view of a pick-up style utility vehicle 1 according to one embodiment of the present invention. The vehicle typically has a body coupled to four rotatable wheels, and one or more rows of seats, each row having one or places for a person to sit. Vehicle 1 typically includes a front seat 3, which is typically a bench seat configured to accommodate up to two persons, one side of which is used as a driver's seat and the other side of which may be used as a passenger's seat. Vehicle 1 typically further includes a rear seat 4, which is also typically a bench seat configured to accommodate two passengers. Thus vehicle 1 typically may accommodate up to four persons in total. Of course, the above embodiment is merely illustrative, and it will be appreciated that various other seat configurations may be provided. For example, each of the front and rear rows of seats may include pairs of individual seats, rather than bench seats, or each of the rows of seats may only be designed to accommodate one passenger. Behind the rear seat 4, there is provided a cargo bed 2. Cargo bed 2 is typically rectangular in shape, and includes a surrounding panel assembly formed around its perimeter, the surrounding panel assembly including a front panel and side panels. Alternatively, the cargo bed may be of another suitable polygonal or curved shape for holding cargo. A divider 5 is attached to the foremost end of the cargo bed 2 to separate the rear seat 4 from the cargo bed 2. Typically, the divider is a meshed screen shield 5. Alternatively, the divider may be a non-meshed

panel or other suitable dividing structure.

[0023] A cabin frame 6 is provided over the seats, and defines a cabin space for the driver and passengers. The cabin frame 6 includes a pair of side bars 61 provided on the right and left sides of the vehicle body to define side face of the vehicle 1. Typically the side bars arc from the front to the rear of the vehicle to define a passageway through which passengers may enter and exit seats 3, 4. A front portion of each side bar typically attaches to the vehicle body at a respective mounting location adjacent a right or left side of a hood of the vehicle, and extends rearwardly and upwardly to a roof. The roof is typically substantially flat, and defined by a middle portion of each of the side bars and a plurality of transverse bars 62 stretching between the side bars. The roof is typically formed to provide sufficient head room for any passengers seated in seats 3, 4. A rear portion of each of the side bars extends downward from the roof and attaches to the vehicle body adjacent the rear seats 4. Arm bars 30 may also be provided adjacent a right and left side of seat 3, and typically mount the seat back to the seat base of seat 3. Alternatively, the cabin may be formed in another shape suitable to hold passengers.

[0024] As shown in broken lines in **FIG. 2A and 2B**, rear seat 4 is coupled to the body of the vehicle in a manner that enables the rear seat to be movable between a stowed configuration, shown in Fig. 2B, and a deployed configuration shown in Fig. 2A. The rear seat 4 typically includes a bottom portion 42 upon which one or more passengers may sit, and a backrest portion 41 configured support each passenger's back. The bottom portion 42 is typically supported in the deployed configuration by the bottom plate 20 of the cargo bed. A lower end of the back portion 41 is typically pivotably mounted by a pivot 43 to a rear end of bottom portion 42, such that the back portion may be folded forward by a user to lie in a substantially flat intermediate position, shown in dashed lines in Fig. 2A. Further, a front end of the bottom portion 42 is hinged to the vehicle body so as to be rotatable around a pivot 44. Typically, the bottom portion 42 is connected to the pivot 44 through an

arm 45 extending downwardly from the front end of the bottom portion 42, so that a bottom surface of the bottom portion 42 is moved to a location forward of the pivot 44 when retracted. Thus, the seat can be moved from the intermediate position to a stowed configuration, shown in **FIG. 2B**, in which the entire rear seat 4 is retracted into a leg space 7 of the vehicle. The leg space is typically defined as the space in front of and/or below the rear seat 4 in the deployed configuration, where a passenger might rest his or her legs while riding in the vehicle.

**[0025]** In this embodiment, cargo bed 2 is configured to be extendable forward into a space at least partially occupied by the rear seat 4 when the rear seat was in the deployed configuration, as described in more detail hereinafter. The screen shield 5 may be manually removed from the cargo bed 2 and reattached to a foremost end of an extendable portion 21 of the cargo bed 2, to enable the screen shield 5 to be repositioned from a position adjacent the forward end of the cargo bed in the retracted configuration to a position adjacent the forward end of the cargo bed in the extended configuration.

**[0026]** Thus, a user who desires to carry a large load rather than passengers in the rear seat 4, may move the rear seat from the deployed to the stowed configuration, thereby freeing space formerly occupied by the rear seat in the deployed configuration. This may be accomplished by folding down the back portion 41 to the intermediate position, and pivoting the bottom portion 42 with the folded backrest portion 41 into the stowed configuration in leg space 7. Once the seat is in the stowed configuration, the user may remove the screen shield 5 from the cargo bed 2, and extend an extendable portion of the cargo bed from a retracted configuration to an extended configuration, into the space freed by moving the seat. The user typically may accomplish this by extending the sides of the cargo bed, by pivoting or sliding, as discussed below. Once the cargo bed is in the extended configuration, the user may reattach the screen shield 5 adjacent a forward end of the cargo bed 2 in the extended configuration, thereby providing extended cargo space for the large

load.

[0027] According to another embodiment of the present invention, shown in **FIG. 3A and 3B**, utility vehicle 1 may include a relatively large cargo bed 2b which is slidably attached to the vehicle body, such that the cargo bed may be moved between a first configuration, also referred to as an overhang configuration, shown in Fig. 3A, in which a rear end of the cargo bed overhangs the rear wheels of the vehicle to a greater extent, and a second configuration, also referred to as a compact configuration, shown in Fig. 3B, in which the rear end of the cargo bed overhangs the rear wheels of the vehicle to a lesser extent than the first configuration, and in which the forward end of the cargo bed is positioned in a space formerly occupied by the rear seat in the deployed configuration. The bottom plate 20 of the cargo bed 2b typically includes an upper bottom plate 20a and a lower bottom plate 20b, which are slidable relative to each other along a longitudinal direction of the vehicle, to thereby enable the cargo bed to move between the first and second configurations.

[0028] A portion of the lower bottom plate 20b is positioned beneath the seat portion 42 of the rear seat 4 to stably hold the seat portion 42 thereon when the entire rear seat 4 is not retracted. Typically, this embodiment is manufactured using substantially the same chassis as the embodiment shown in Figs. 2A and 2B, and only the structure of the cargo bed differs between the embodiments.

[0029] With this configuration, even when the rear seat 4 is occupied by one or more passengers, the cargo bed 2b can carry a large load. However, in this embodiment, since an upper part of the cargo bed 2b, excluding lower bottom plate 20b, , protrudes to the rear of vehicle 1 well over a pivot 22 around which the entire cargo bed 2b can be tilted for unloading when unlocked, a load in a rear portion of the cargo bed 2b creates a moment around the pivot 22. Therefore, as shown in **FIG. 3B**, the upper part of the cargo bed 2b is formed to be manually slid forward with respect to the lower bottom plate 20b until a front portion of the upper part of the cargo bed 2b reaches a location formerly occupied by the

stowed rear seat 4. In this embodiment, while cargo bed 2b is not typically configured to be adjustable in size, a relatively large cargo bed may be provided, which may be moved into an overhang configuration to accommodate passengers, or into a compact configuration when the rear seat is stowed.

[0030] Returning to the embodiment discussed with respect to FIGS. 2A and 2B, it will be appreciated that the rear seat 4 may be utilized as a front panel for the cargo bed 2. As shown in detail in **FIG. 4A**, the rear seat 4 may be pivotably mounted to the vehicle's body. As shown in **FIG. 4B**, the rear seat 4 may be manually retracted to a stowed configuration such that a bottom surface of the bottom portion 42 of the rear seat 4 covers a front opening of the cargo bed 2, and the rear seat 4 is locked to the position by an appropriate locking mechanism (not shown). In this example, the rear seat 4 serves as the front panel of the cargo bed 2 and, thus, typically no screen shield 5 is installed. However, the screen shield 5 may be attached to the extendable portion 21 of the cargo bed 2, if desired.

[0031] According to another embodiment of the present invention, shown in **FIGS. 5A and 5B**, rear seat 4 is configured to be movable to a stowed position in which a bottom surface 42a is substantially parallel and positioned upside down in front of bottom plate 20, such that a portion of the cargo bed 2 (such as extendable portions 21) may rest upon the bottom surface of the seat. As shown in **FIG. 5A**, the rear seat 4 is hinged to the vehicle body utilizing a hinge 48 having two pivots 46, 47. As shown in **FIG. 5B**, the entire rear seat 4 can be manually retracted to an upside-down configuration into leg space 7, and the rear seat 4 may be locked to the position by an appropriate locking mechanism (not shown). Therefore, the entire seat portion 42 is moved in front of the pivot 47 when in the retracted configuration, so that the bottom surface of the seat portion 42 and the foremost part of the bottom plate 20 of the cargo bed 2 form a substantially continuous plane.

[0032] The extension of the cargo bed 2 may be achieved as shown in **FIG. 6 and 7**. Fig. 6 shows extendable portions 21 serving as a front panel of cargo bed 2 when extendable

portions 21 in a retracted configuration. Each of the extendable portions 21 is hinged at a proximate end by hinges 23 to a front end of a respective side panel 26. Each of the extendable portions typically has a length of approximately a half of the width of the cargo bed 2. The extendable portions 21 may be moved from the retracted configuration in which they serve as the front panel, as illustrated with solid lines in **FIG. 6**, by pivoting the extendable portions around the hinges 23 approximately 90 degrees to an extended configuration illustrated with two-dot-chain lines in **FIG. 6**.

[0033] As also shown in **FIG. 6**, an opening 24 (typically square) is formed so as to be opened upwardly at the front end of each of the side panels 26. The screen shield 5 is typically substantially a rectangular shape and its upper part has a width corresponding to the distance between outer surfaces of the side panels 26. The lower part of the screen shield 5 is narrowed to correspond the distance between inner surfaces of the side panels 26. Typically, the upper part of the screen shield 5 is meshed and the meshed portion is divided in two at the middle thereof, to leave a solid rib therebetween to add strength to the screen shield 5. Bosses 50 are provided to the upper end of the narrowed section of the screen shield 5 so as to protrude downwardly. The screen shield 5 is attached to the front ends of the side panels 26 so that the bosses 50 are inserted into the openings 24 formed in the side panels 26 when the extendable portions 21 are retracted to be the front panel of the cargo bed 2. The extendable portions 21 also have upwardly-opened openings 25 of the same shape and size as the openings 24 of the side panels 26, at opposing ends.

[0034] Accordingly, when user wants to extend the cargo space, the user pulls out the screen shield 5 from the openings 24 of the side panels 26. Then, the user rotates each of the extendable portions 21 from the solid-lined retracted position to the two-dot-chain-lined extended position, each rotating approximately 90 degrees. The user then reattaches the screen shield 5 to the openings 25 of the extendable portions 21. Here, the narrowed lower section of the screen shield 5 is configured to reach down to the upper

surface of the bottom plate 20 so that it also serves as the front panel of the cargo bed 2 when the extendable portions 21 are extended.

[0035] The extension of the cargo bed 2 may also be achieved as shown in **FIG. 7**. In this example, the extendable portions 21 are provided so as to slide relative to the cargo bed 2 in a longitudinal direction of the vehicle. The extendable portions 21 may be provided to the bottom plate 20 or the side panels 26 through an appropriate sliding means such as a combination of rollers and rails. In this example, the extendable portions 21 typically do not serve as the front panel of the cargo bed 2 since they are forwardly extendable to an extended configuration (as shown with two-dot-chain lines in **FIG. 7**) from a retracted configuration (as shown with solid lines in **FIG. 7**). Instead, in this example, the narrowed lower section of the screen shield 5 serves as the front panel of the cargo bed 2 when the extendable portions 21 are extended as described above. To achieve this, the extendable portions 21 have upwardly-opened openings 25 at foremost ends to accommodate the bosses 50 of the screen shield 5. In this example, the screen shield 5 may be fixed to the extendable portions 21 and moved with the extendable portions 21, since a distance between the openings 25 does not change during the slide movement of the extendable portions 21.

[0036] In the above embodiments, it has been described that back portion of the bench-type rear seat is foldable to provide the space for the cargo bed, however, it will be appreciated by those skilled in the art that only a section thereof may be foldable and moveable between the deployed and retracted positions, or the rear seat may have a plurality of independently stowable and deployable sections. . In addition, while a two-seat type vehicle has been illustrated, it will be appreciated that the present invention is also applicable to utility vehicles with only one seat, in which the seat's backrest portion on a passenger's side is independently foldable relative to the driver's side. Further, while bench seats have been illustrated, it will be appreciated that the present invention is

applicable to utility vehicles of a non-bench-seat type in which the passenger's seat is foldable and the entire passenger's seat is independently formed from the driver's seat. Further, as described above, it will also be appreciated by those skilled in the art that the present invention is also applicable to utility vehicles with three or more rows of seats.

[0037] As this invention may be embodied in several forms without departing from the spirit of essential characteristics thereof, the present embodiments are therefore illustrative and not restrictive, since the scope of the invention is defined by the appended claims rather than by the description preceding them, and all changes that fall within the metes and bounds of the claims, or equivalence of such metes and bounds thereof are therefore intended to be embraced by the claims.